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REPORT TO THE UNITED KINGDOM  
CONTAINING RECOMMENDATIONS  
FOR THE  
ESTABLISHMENT OF PILOT LAND USE PROJECTS  
ON THE  
ISLANDS OF ST. VINCENT AND ST. LUCIA,  
BRITISH WEST INDIES

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Washington D. C.  
March, 1954

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RECOMMENDATIONS FOR THE ESTABLISHMENT OF PILOT LAND USE  
PROJECTS ON THE ISLANDS OF ST. VINCENT AND ST. LUCIA,  
BRITISH WEST INDIES

SUMMARY

Soil erosion and accompanying loss of soil fertility on the steep peasant lands have created a serious problem in the Islands of St. Vincent and St. Lucia. The cultivation of very steep slopes, necessitated by the population pressure, along with the constantly shifting type of cultivation further adds to the problem. No concerted effort has been made by the peasants in a small concentrated area to establish tropical soil conservation practices.

The Islands, with high axial ridges and numerous spurs running to the sea, are divided naturally into many small watersheds. These watersheds lend themselves well to the watershed treatment concept.

Well informed agricultural officers on both Islands are convinced that the peasant farmers will adopt conservation farming and proper land use practices if shown how to install them, and are given some aid in obtaining planting stock.

It is therefore recommended that:

1. Pilot land use projects be established in the York River watershed of the Island of St. Vincent, and in the Fond-Assau Valley (Marquis River watershed) in the Island of St. Lucia.
2. A team of Soil Conservation Service personnel familiar with watershed planning and, if possible, with tropical soil conservation, be sent first to St. Vincent to engage in exploratory studies in tropical soil conservation practices.
3. The Agriculture Departments of St. Vincent and St. Lucia assign a group of their best trained agricultural workers to accompany the Soil Conservation Service workers in this exploratory study. These workers should be college graduates, if possible, and should have had some preliminary training in tropical soil conservation.
4. The team of Soil Conservation Service workers and the agricultural workers of St. Vincent plan the York River watershed in St. Vincent. In doing this the agricultural workers of St. Vincent will become trained in the techniques of watershed planning.
5. The Soil Conservation Service team (with the exception of one competent farm planner and one conservation engineer) move to St. Lucia and proceed to plan the Fond-Assau Valley with the assistance of the agricultural workers of St. Lucia.
6. The two men remaining (Soil Conservation Service workers) on St. Vincent act as supervisors, or overseers, of the agricultural







workers of St. Vincent in the application, or implementation of the plan developed in the York River watershed. When the agricultural workers of St. Vincent have become proficient in the techniques of applying the conservation practices and measures to the land, the two Soil Conservation Service men should move on to St. Lucia and assist with the application of the watershed plans in the Fond-Assau valley.

In order to implement the application of conservation practices and measures on St. Vincent, it is recommended that the sound land use law recently passed by the Legislative Council be proclaimed law by the necessary legal procedure. It is also recommended that the Island of St. Lucia pass a sound land use law similar to the law in St. Vincent.

When the team of Soil Conservation Service workers has completed its task, it will then return to the States, and the trained agricultural workers remaining in the Islands will proceed to plan other small watersheds as requests develop.

The watershed approach will fit in well with the present plans of development for the two Islands. By concentrating the work in a single small watershed, results from sound land use and the application of soil conservation measures can be readily seen and appreciated by the populace.

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## DESCRIPTION OF THE ISLANDS

### Location

St. Vincent and St. Lucia are part of the Windward Islands which are the southern-most group of the Lesser Antilles. These Islands lie roughly north of the Island of Trinidad, which is just off the northeastern coast of Venezuela. St. Vincent and St. Lucia are about 135 and 165 miles north of the Island of Trinidad, respectively.

### Physical Conditions

The Island of St. Vincent contains 133 square miles, and the Island of St. Lucia contains 233 square miles. They are entirely volcanic in origin. They both contain north-south central ridges with numerous lateral spurs running to the sea. These spurs tend to divide the Islands into many small drainage basins, each with its own particular problems.

On much of the two Islands the soils are similar in nature and would require similar treatment from a conservation standpoint. There are two areas of great dissimilarity between the Islands. The northern third of St. Vincent is dominated by recent volcanic ash, varying in thickness from a few inches to hundreds of feet, laid down by eruption of the Soufriere volcano in 1902-3. On St. Lucia the northern and southern tips of the island consist of areas of thin "shoal" soils on fairly gentle slopes suited primarily to grazing.







The climate of the two islands is similar to that of the other Windward Islands. A fairly well-defined dry season extends over the first half of the year, while the last half of the year is usually very rainy. Rainfall in the different parts of the Islands ranges from about 60 inches to 140 inches a year. Certain portions of St. Lucia have received as much as 240 inches of rain a year (1938). On the other hand, the lower-lying northern and southern tips of St. Lucia may receive as little as 35 or 40 inches a year.

Temperatures range from a low of about 65 degrees F. to a high of 90 degrees F. in the lower coastal areas. In the central highlands temperatures are considerably lower. Humidity is continuously high, ranging from 66 to 100 percent.

### Soil Erosion Problems

Land ownership is of three types, i.e., peasant lands, estate lands and Crown lands (national forests). Peasant holdings are usually small, ranging from one acre to 20 acres or more. They are usually located on steeply sloping land and farmed as peasant gardens, with much shifting of cultivation year by year. Estate lands occupy most of the flat alluvial "embayments", and often some of the steep land surrounding them. Lands above the 1000-foot elevation are reserved for the Crown, and are occupied by forests, except where encroached on by the peasants.

Inasmuch as Crown lands are usually in dense forest, no erosion problem is apparent on them. Estate owners are usually progressive and wealthy enough to handle their own erosion problems.

It is the peasant lands that are the chief source of erosion in the Islands. Population pressure is so great that it has forced the peasants to cultivate very steep slopes which are suitable only for some permanent type of vegetation. They cultivate erosion-producing crops such as yams, cassava, ground nuts (peanuts), arrowroot, tania, cotton and others. Often the peasant will run a drain directly downhill, thus creating a gully. Very few conservation measures are used except contour cultivation. As soon as the fertility has been reduced by soil erosion to a point where production is not profitable, the peasant moves to another spot. Here all brush and trees will be cut and burned. This is one of the most damaging of practices on the Islands, and is especially prevalent on St. Lucia. This new plot will be farmed a year or two, then abandoned for another spot. In this way the soil is depleted gradually year after year since little is ever put back into the soil in the way of organic matter. It is estimated that 75 percent of peasant land is either idle or is being farmed on a bare subsistence level.

It is expected that here is where a team of Soil Conservation Service technicians may make its greatest contribution. By teaching the peasant that the same parcel of land can be farmed safely year after year, even increasing fertility by good farming methods, he will learn that it is no longer necessary to practice the shifting type of cultivation.







### Landslides and Landslips

Many occurrences of mass movement of soil are visible throughout the Islands. These occur on steep slopes during periods of high rainfall. Landslides of considerable proportion, causing loss of life and much property damage, have occurred on both St. Lucia and St. Vincent. Many smaller landslips are in evidence, usually on peasant lands.

Control of these landslips may be possible by proper land use and conservation measures, but control of landslides will be more difficult. Methods of control should be studied and recommended by the team of Soil Conservation Service technicians.

### Flood Problems

Flooding does not appear to be of major importance on the Islands, though some flooding occurs almost every year. When floods do occur they are usually of short duration and are confined to the level embayments near the sea. Land use on these areas is such that only minor flood damages occur.

### Social and Economic Factors

In St. Vincent there are an estimated 70,000 people living on an island whose total area is only 133 square miles. If all the land were cultivatable, this would mean an average of 526 inhabitants per square mile. However, fully 50 percent of the land is either inaccessible or not suited for agricultural uses. Therefore, for the part of the Island that is cultivated, the population intensity is over 1000 inhabitants per square mile.

In St. Lucia the situation is much the same. An estimated 83,000 population living on 233 square miles means a population density of 355 inhabitants per square mile. When this population is spread out over the area that is cultivatable, approximately 40 percent of the total area, the population density increased to nearly 900 inhabitants per square mile.

Obviously, under such a population pressure, much land is being improperly used and much wastage of soil resources is taking place. The problem then becomes one of determining ways and means of using the land safely, placing it in the proper land use, and rebuilding the depleted soil. Only by the widespread acceptance of these principles can the Islands of St. Vincent and St. Lucia ever hope to become economically and financially sound. The watershed treatment concept is the most logical approach to the problem.

### SOIL CONSERVATION ON ST. VINCENT

Several estate owners in St. Vincent became conservation conscious some 20 years ago and with the help and guidance of Agricultural Superintendents began trying various ways and means of arresting erosion and rebuilding depleted soils. They have been very successful and have developed conservation measures and practices that appear to have controlled erosion on steep slopes, and even increased production substantially.





Some of the measures and practices used are as follows:

1. Grass barriers and drains

These barriers of vere-de-verre grass are placed on a vertical interval of 10 to 15 feet. Just below the barrier a narrow ditch about 2 feet deep is constructed on a slight grade. This ditch will be outletted onto a natural drain, or down the center of a valley. In one instance observed the outlet also served as a field road. In ordinary rainfall the grass barriers allow little or no water to filter through into the ditches. Only in large downpours do the ditches operate. It was found by experience what grade should be used. If, during a period of years the system appears to be "benching", the grass barriers and drains are re-located and re-established.

2. Strip cropping and crop rotation.

It was found that by alternating crops of sugar cane and arrowroot the soil loss was greatly reduced. Sugar cane is a 4 or 5 year crop, and the root system is such that it binds the soil and prevents erosion. Arrowroot is an erosion-producing crop, but when grown in alternating strips with sugar cane, soil loss can be kept to a minimum. Strips usually occupy the area between the grass barriers and drains.

3. Mulching and manuring.

Mulching and manuring has been a standard practice on some estates for many years. Estate owners soon found the value of returning all possible residue to the soil. Consequently all strippings from sugar cane are returned to the soil. Thin and eroded spots are given heavy applications of manure. In arrowroot fields a leguminous tree (gliricidia) is grown in rows 15 to 20 yards apart up and down the hill. Leaves and limbs are cut from the trees 3 or 4 times yearly and spread out over the soil. The trees are kept pruned down to a height of 4 or 5 feet. When sugar cane is grown in the area the trees are kept pruned down even lower so as not to interfere with cane growth.

4. Reclamation of eroded areas.

This has been accomplished, either by planting the eroded area in grass or in trees for a period of 4 or 5 years or longer. When the gliricidia legume is used, some of the trees are allowed to grow to full height, and others are stripped of their foliage regularly and the foliage used as mulch. Pen manure is also added when available.

The reclamation of eroded areas is one of the most important





practices that must be established on the Islands. Thousands of acres lie idle because of erosion or depleted soil fertility. Such areas can be reclaimed rather rapidly, as has been demonstrated, but it is not an accepted practice. This practice must take a prominent place in any pilot land use projects on the Islands.

5. Diversion drains to protect cultivated land.

Coconut groves on steep slopes produce considerable runoff due to the thick matting of the coconut tree roots. This water, if allowed to flow over the lower-lying gently sloping cultivated fields, can cause severe erosion. It was found that by constructing a drain at the lower end of the coconut groves to take the excess water safely away, the fields below were adequately protected.

6. Grass barriers in coconut groves.

On the land settlement projects a new coconut grove (4 or 5 years old) was noticed with grass barriers established throughout. The manager expects to leave these barriers in the groves to determine whether or not they will be effective in reducing runoff. Soil erosion in established coconut groves does not appear to be a problem.

7. Clearing new land.

On the land settlement project in the recent volcanic ash area, a cocoa plantation was being established. In clearing the land for this plantation natural wind breaks were left at regular intervals but all the remaining vegetation was left on the ground to decay and form an organic mulch.

8. Commercial fertilizer.

The use of commercial fertilizer is spreading rapidly, especially on the estates. Its use should be extended to the smaller land owner.

9. Cover crops.

In the sugar cane area on the windward side of the Island, one large field was seen in which cow peas had been planted between the rows of cane (which had just been harvested). The owner expected to harvest the peas, then turn the residue under before the cane grow too high.

10. Contour cultivation.

This practice is the only one universally accepted on St. Vincent.





Very few fields of row crops were seen which were not contoured. Unfortunately the growing of arrowroot does not lend itself well to contour cultivation.

There are undoubtedly other conservation measures being used on St. Vincent. These should all be investigated by the Soil Conservation Service team.

#### Additional conservation measures needed.

While much progress has been made in the conservation field on St. Vincent, much still remains to be done. Probably not more than 10 percent of the cultivated sloping land has received such intensive conservation measures that it can be considered safe. Another 15 or 20 percent of the land has some kind of conservation measure other than contour cultivation, but it is not considered adequate, and the land is continuing to deteriorate. The remaining land, though much of it is farmed on the contour, is deteriorating at varying rates. This land is mostly in peasant holdings of small size.

There is a great need for the introduction of new grasses and legumes that can be used in reclaiming eroded land. There is also a need for introducing palatable grasses that will grow well in partial shade, such as under old established coconut trees. A large acreage of grazing land could be developed in this way, and the production of beef and dairy products increased substantially.

In St. Lucia there is also a need for introducing new grasses and legumes, especially on the shallow soil areas which are suited primarily for grazing.

There will undoubtedly be a need in certain local areas for engineering structures such as drop inlets, spillways, chutes or other types of water-control structures. Consideration should be given to the sloping, shaping and sodding of the entrenched waterways occurring on the Islands. The team of Soil Conservation Service planners will be able to give considerable advice and information along this line.

### RECOMMENDATIONS

#### Exploratory studies

A team of Soil Conservation Service personnel familiar with watershed planning (preferably with experience in the southeastern states or in the tropics) should be detailed to the Island of St. Vincent for the purpose of studying the conservation measures which have been established on certain of the estates, and which appear to be satisfactory.

The team should catalogue all conservation measures being applied to the land and determine which are the most effective. They should observe the combinations of measures and practices being applied to the more sloping lands and which appear to be satisfactorily controlling erosion. They should pay special attention to the methods used in increasing soil fertility by the use of mulches and manures. They should note methods used in





reclaiming small severely eroded areas. In cooperation with estate owners, the local soil surveyor, and agricultural officers they should determine broad fertilizer requirements for the various crops and soils.

The agricultural engineer should make measurements of the vertical intervals used on the different slopes where grass barriers and drains are installed. If possible he should derive a formula for determining the vertical interval of the barriers and drains, based on the experience of the land owners. He should determine by measurement the grade on which the ditches are installed.

This exploratory study is most important in the development of a plan for a watershed. Nothing should be overlooked. Practices that have failed, or do not appear to be practical, should be studied along with the successful practices. This must be a thorough and searching study that will look into all phases of tropical soil conservation. The team of Soil Conservation Service technicians will undoubtedly be able to suggest additional practices that may be used.

Costs of establishing all practices must be determined. This is important, since it will be used later in determining the cost of converting from the present type of farming to the conservation type of farming.

The team, in cooperation with local agricultural officers, progressive estate owners and the local soil surveyor, should then make a study of the land in order to set up a tentative capability grouping for the Island. The land will probably be divided into seven classes as follows:

Class I. Land that can be cultivated safely with no special conservation measures other than good farming methods.

Class II. Land that can be cultivated safely with easily applied conservation measures and good farming methods.

Class III. Land that can be cultivated safely only with intensive conservation measures carefully applied, together with good farming methods.

Class IV. Land that can be cultivated only occasionally or with extreme care. As a rule soils in this class are very steep and are better suited to grass or trees, including the tree crops.

Class V. Land, because of steepness or other factors, is not suitable for cultivation but is fairly well suited to the growing of grass or trees.

Class VI. Land unsuited for cultivation, and at best is rather poor for grass and trees.

Class VII. Land that is unproductive from every standpoint, such as stony river wash, dry rivers or bare rock outcrop.





As the various capability classes are being set up, the local soil surveyor and the soil surveyor from the Soil Conservation Service, under the guidance of the party leader, should determine those combinations of soil, slope and erosion which make up each capability class.

After a tentative capability grouping has been made the team should determine which measures or combination of measures appear to be needed in order to properly protect the different classes of land.

This tentative capability grouping and the tentative selection of measures or combination of measures necessary for treating each group may be revised as more experience is gained, and as more observations are made by the team.

In these exploratory studies it is recommended that the best qualified agricultural workers on the Islands of St. Vincent and St. Lucia be detailed to accompany the team of Soil Conservation Service technicians. These men should be college graduates, if possible, and should have had some training in tropical soil conservation.

The Soil Conservation Service team should consist of a party leader, a soil surveyor, two farm planners, two agricultural engineers, one grass specialist and one economist. (See Appendix 1 for estimate of length of detail and estimated cost).

The agricultural workers furnished by St. Vincent and St. Lucia should consist of the following from each Island: one extension officer, one farm planner and one agricultural engineer. It is anticipated that the soil surveyor on St. Vincent will make the necessary future soil maps, or will be able to train an agricultural worker to do so.

The exploratory studies should be completed early in the dry season, and should take about 4 weeks time.

#### Planning the Watershed.

In St. Vincent it is suggested that the York River in the Mesopotamia Valley be used as a pilot land use demonstration project. The area consists of 3,329 acres, practically all in peasant ownership. It is easily accessible from Kingstown, and most of it can be seen from a number of vantage points. However, travel within the watershed is quite difficult, and it is therefore recommended that three Willys Jeeps (right hand drive) be furnished the survey party for transportation.

Enlarged aerial photographs will be necessary for the mapping and planning of the area. These photographs must be requested well in advance of the commencement of planning operations. A scale of 12 inches equal one mile is suggested. Two sets of aerial photographs cover the area, both on a scale of 1 to 18,000. It would be necessary to enlarge this scale to 1 to 5,280 from the negatives of the photographs. These negatives should be made available to the Cartographic Division of the Soil Conservation Service in





Washington, D. C. so that the necessary enlarged prints could be made. The negatives would be returned to the British Government. Three sets of these enlarged photographs should be furnished for the use of the planners. An uncontrolled mosaic should be made also. Appendix 2 lists the photographs needed for the York River watershed on St. Vincent and the Fond-Assau Valley of St. Lucia.

The agricultural workers of St. Vincent should assist in planning the York River watershed. After the exploratory studies the workers from the Island of St. Lucia could either assist in the planning of York River in order to get more training, or could return to St. Lucia, depending on the desires of their government.

A number of steps are necessary in the planning of a watershed. These steps are listed below in approximate chronological order.

1. Advance preparation. In this new approach to the solving of the agricultural problems of the Islands much attention should be given to properly acquainting the peasant landowners with the concept of watershed treatment. The Agricultural Director and Extension Director will necessarily take the lead in informing the landowners on this subject. In this connection, it is recommended that several key agricultural officers from each of the two Islands visit the United States for approximately three months prior to the inception of this project for the purpose of studying the work that is being done in watershed protection. Only in this way can the watershed treatment concept be properly impressed on them, so that they, in turn, may impress the farmers in the watershed.

Advance meetings should be held to explain the program and to quell the rumors that are sure to commence.

All during the planning stage the extension officer should make every attempt to get the idea over to the people. The farm planners should also assist in this activity whenever they are approached by the farmers.

2. Preparation of base maps. A plain watershed map should be made from the mosaic. This should be a tracing which can be reproduced by ozalid or blue print. This map should show roads, trails, prominent buildings, water courses, and drainage divides. A liberal supply of these maps should be made available, probably 15, since they will be the base on which field data will be recorded. At least 6 transparencies of this map should be made for use in making overlays.
3. The soil survey. On one set of the aerial photographs a soil map should be prepared. This map should show soil type, slope, erosion and possibly land use. Any other important features such as stoniness, extent and size of boulders, rock outcrop, etc., should be





shown. Any property boundary that is easily located should be recorded, and transferred to the set of photographs that will be used in determining ownerships.

It is expected that the soil surveyor can complete the survey of York River watershed in two months. His assignment should be so timed that he will complete the survey by the time the team is ready to begin planning the watershed. He should then proceed to St. Lucia and spend two months making a soil survey of the Fond-Assau Valley. A jeep should be sent with him for transportation.

4. The capability map. The capability classes should be indicated on the soil map, and a capability map prepared of the watershed, probably in colors on a transparency.
5. Field work. Intensive planning of the watershed in the field will then be necessary. From the soils map and the capability map proper land use will be determined. Conservation measures needed for each capability class will be recorded. Engineering works such as grass barriers and drains, diversions, sodded outlets and drop inlets will be tentatively located on the ground, and will be plotted on a plain map.
6. Land use and development map. This map will be developed from information obtained in step 5. It will be a complete plan for the watershed, showing land use and conservation and engineering measures necessary for the full development of the watershed. This map will be prepared without regard to ownership.
7. Ownership map. Since no ownership maps are available in the watershed, it will be necessary to prepare one. This can probably best be done by the soil scientist and a local guide. The original ownership map should be made on a blank set of aerial photographs, then this information transferred to a transparency of the watershed.
8. Present land use map. A land use map will be prepared showing how intensively the land is being used. Land use may be mapped when the soil survey is made, or it might be necessary to make a separate survey and map.
9. Economic studies
  - a. Present income. Economic studies will be made to determine the present per-acre income from the various types of enterprises. In this way the present income from each operating unit may be determined, using the present land use and ownership maps.
  - b. Future expected income. From the land use and development map (step 6), and other information on potential production,





costs, prices, etc., the future expected income per acre for the various enterprises will be determined. By reference to the ownership map and land use and development map, the capital investment necessary to convert from the present type of farming to the conservation type of farming will be determined. This study will show whether or not it is economically feasible for an individual operator to convert to the conservation type of farming.

10. Until the ownership pattern is established it will not be possible to make recommendations concerning individual farm maps. Certainly on the larger units it will be advisable to furnish a land use and development map for the guidance of the farmer.

The above steps will clearly indicate the agronomic and engineering measures needed for the full development of the watershed. They will indicate the problems that will be encountered when the plan is placed into effect.

With changing techniques it is expected that there will be some deviation from the above steps. They are not set up as hard bound rules, but simply as guides.

#### Application of the plan.

With completion of the York River watershed plan, it is expected that the Soil Conservation Service survey party, with the exception of one farm planner, one engineer, and possibly the economist, will move on to St. Lucia to prepare a similar plan on the Fond-Assau Valley in the Marguis River watershed.

The agricultural workers of St. Vincent, who have assisted in the planning of the York River watershed, will be leaned on heavily in the application of the program to the land. These workers know the peasants with whom they will have to deal and know local customs and superstitions.

The new idea of treating a complete small watershed intensively was discussed with the agricultural officers of St. Vincent and St. Lucia. They are in agreement that the peasants will accept this type of approach. These officers feel that the peasants will do the things required of them, if only shown how to do them properly. It is on this belief of the agricultural officers that the recommendations in this report have been made.

During the planning of the watershed the extension officer and others will have informed the peasants thoroughly about the project. They should impress upon the peasants that it will be necessary for them to work together in groups in order to successfully carry out the plan. For instance, a grass barrier and drain may run through 10 or 15 different properties before it can be safely outletted. Obviously, each owner would be called on to properly install and maintain that part of the barrier and drain that runs through his property.





The failure of one owner to fulfill his obligation would cause the entire system to break down.

For situations such as this, it is essential to the fulfillment of the plan that a sound land use law be enacted on each of the two Islands. At the present time it is understood that St. Vincent has been through the preliminaries, and can proclaim the sound land use policy as a law at any time. A similar law is recommended for the Island of St. Lucia. It is understood that some groundwork has already been done in this connection in St. Lucia.

It is not possible to establish definite rules for the application of the watershed plan. Experience in the States indicates that the group approach works satisfactorily. It is therefore recommended that the group approach be used in the establishment of the watershed treatment program. This approach would be necessary where there are a large number of very small ownerships. Some of the larger ownerships might merit individual attention.

Where the group approach fails it might be necessary to resort to some form of compulsion. Probably the threat of compulsion would be sufficient to get results.

In order to implement the establishment of the watershed program it will be necessary to furnish various types of planting stock to the peasants, probably free of charge. Both St. Vincent and St. Lucia are expanding present facilities for the propagation of cocoa trees. St. Lucia is also furnishing banana stock at nominal cost to the peasants. This practice should be extended to include furnishing of coconut seedlings where it is necessary for a peasant to change from clean tilled crops to coconut trees.

In the application of the watershed plan it will be necessary to work with groups of peasants on their holdings. The plan will be explained to them and each will be told what is expected of him. The engineer will lay out grass barriers and drain systems on the farms, using stakes to mark the lines. All other engineering works also will be laid out and staked.

The peasants will be taught how to install the systems, and a plan for installation will be developed. Grass sod for the establishment of the grass barriers should be furnished free of charge.

For those peasants who will have to retire their land to a permanent type of tree crop, such as coconut, there should be a gradual change so as not to upset the economy of the peasant too greatly. Probably only one-fifth, or even one-tenth of the conversion should be made each year, so that by the time the grove is completely established the older trees will be in production.

Some amount of labor will be needed in the establishing of sodded outlets and in the construction of drop inlets or other engineering structures which the peasants will be unable to construct themselves. It is impossible to make a reliable estimate at this time as to the amount of labor and materials that will be required for this type of work. When the watershed





plan is complete a competent estimate of labor and materials requirements can be made.

#### COSTS

It is estimated that the cost of detailing a team of Soil Conservation Service personnel to the Islands of St. Vincent and St. Lucia for the purpose of establishing a pilot-demonstration soil conservation program on each Island, will be approximately \$50,000, divided equally between the two Islands.

Costs not included are salaries and expenses of the agricultural workers who will be assigned to the project by the Island Governments. No estimate has been made as to the size or cost of the labor force necessary to install those portions of the program which cannot be installed by the peasants.

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This report is submitted by C. E. Ghormley and John O. Roy of the Soil Conservation Service, U. S. Department of Agriculture, Washington, D. C.  
March 29, 1954.





Appendix 1

Cost Estimates

<u>Personnel</u>		<u>Length of Detail</u>	<u>Travel</u>	<u>Quarters Allowance</u>	<u>Salary</u>	<u>Total</u>
<u>Title</u>	<u>Grade</u>					
Party Leader	GS-12	8 mo.	1000	<u>1/</u> \$1900	\$5100	\$8000
1 Farm Planner	GS-9	7 mo.	500	700	3170	4370
1 Farm Planner	GS-9	7 mo.	500	700	3170	4370
1 Engineer	GS-9	7 mo.	500	700	3170	4370
1 Engineer	GS-9	7 mo.	500	700	3170	4370
1 Economist	GS-9	7 mo.	500	700	3170	4370
1 Soil Surveyor	GS-9	6 mo.	500	600	2720	3820
1 Grass Specialist	GS-12	3 mo.	500	400	1910	2810
Local Stenographer	Local	5 mo.	0	0	500	500
Local Stenographer	Local	4 mo.	0	0	400	400
Local Guides	Local	5 mo.	0	0	250	250
Local Guide	Local	4 mo.	0	0	200	200
Total			\$4500	\$6400	\$26,930	\$37,830

Equipment

3 jeeps (4 wheel drive) right hand drive @ \$1750	\$5,250
Shipping cost, estimated	600
Office equipment (other than desks and chairs)	500
Field equipment, augers, abneys, levels, etc.	500
Estimated gasoline, oil and upkeep of jeeps	<u>1,500</u>
Total	\$8,350
Contingency	3,820
Grand Total	<u><u>\$50,000</u></u>

1/ Per diem @ \$8.00 per day. Party leader will be traveling between the two islands continuously.





## Appendix 2

A. Aerial photographs of the York River watershed consist of 2 sets as follows:

1. Flown by: Photographic Survey Corporation, Ltd, Toronto, Canada

Scale: 1/18,000

Date: 1950

Map Nos.: Line 33, CAR-22, Nos 6, 7, 8, 9, and 10  
Line 35, CAR-23, Nos. 8, 9, 10, and 11 1/  
Line 36, CAR-23, Nos. 7 and 8

1/ Nos. 9, 10, and 11 much clouded.

2. Flown by: Air Survey Co. Ltd., London, England

Scale: 1/18,000

Date: 1951

Map Nos.: Run 4, Nos. 35, 36, 37, 38, and 39  
Run 3, Nos. 70, 71, 72, 73, 74, and 75

B. Aerial Photographs of Fond-Assau Valley

Flown by: Unknown

Scale: 1/10,000

Date: 1951

Map Nos. SL-3, 57 through 63  
SL-3, 83 through 92  
SL-3, 120 through 132  
SL-4, 14 through 24  
SL-4, 42 through 50

The area of the entire Marquis River watershed above the Marquis Estate - Union Road is approximately 5,080 acres. The watershed is divided into two valleys, the most westerly being named the Fond-Assau Valley. The area of the Fond-Assau valley is approximately 3,200 acres.

*1:7920 = 8 in*

Enlargements of the above photographs to a scale of 1/6600 (8" - 1 mile) could be accomplished by using a set of the positive photos above. At least 3 sets of the above photos are available in the Lands and Surveys Department, Castries, St. Lucia. B.W.I.

Agr-SCS-Ft.Worth, Tex., 1954



